

**PROJECT 10073 RECORD CARD**

|   |   |  |
|---|---|--|
| 1. DATE<br>18 November 1963   | 2. LOCATION<br>New Paltz, N.Y.  | 12. CONCLUSIONS<br><input type="checkbox"/> Was Balloon<br><input type="checkbox"/> Probably Balloon<br><input type="checkbox"/> Possibly Balloon<br><br><input type="checkbox"/> Was Aircraft<br><input type="checkbox"/> Probably Aircraft<br><input type="checkbox"/> Possibly Aircraft<br><br><input checked="" type="checkbox"/> Was Astronomical Meteor<br><input type="checkbox"/> Probably Astronomical<br><input type="checkbox"/> Possibly Astronomical<br><br><input type="checkbox"/> Other<br><input type="checkbox"/> Insufficient Data for Evaluation<br><input type="checkbox"/> Unknown |
| 3. DATE-TIME GROUP<br>Local _____<br>GMT 18/0905Z   | 4. TYPE OF OBSERVATION<br><input checked="" type="checkbox"/> Ground-Visual <input type="checkbox"/> Ground-Radar<br><input type="checkbox"/> Air-Visual <input type="checkbox"/> Air-Intercept Radar |  |
| 5. PHOTOS<br><input type="checkbox"/> Yes<br><input checked="" type="checkbox"/> No   | 6. SOURCE<br>Civilains  |  |
| 7. LENGTH OF OBSERVATION<br>5 Minutes   | 8. NUMBER OF OBJECTS<br>1   | 9. COURSE<br>SE  |
| 10. BRIEF SUMMARY OF SIGHTING<br>White smoke like streak breaking into 300-400 pieces. Particles travelled through sky in V formation. Resembled ECHO or SPUTNIK. Dull faint sound of explosion. Speed estimated too fast for a/c. Observation duration 5 minutes. Estimated altitude above 50,000ft. Initial observation at 70 deg in South. Disappearing 10 deg elev in East. | 11. COMMENTS<br>No decay for 18 Nov. Evaluated as Meteor. Much conflicting data. Assume narrative of <del>5000</del> speed in excess of a/c indicates motion. Rather than duration (Is correct)       |  |

Wooten, and Larry Smith together saw 26 Leonids and 20 sporadics from Flora, Alabama. The next morning a three-hour watch began at midnight, with 30 Leonids and 36 other meteors logged by the first two observers.

Carl McLellan, Jr., and Robert La Pierre watched on the night of November 16-17 from 9:00 p.m., Pacific standard time, until dawn. During this interval these Whittier, California, amateurs counted 178 meteors.

At Wooster, Ohio, William Werner and nine other members of the Wayne County Astronomical Society recorded 70 meteors during 3½ hours, beginning at 9:10 p.m. CST.

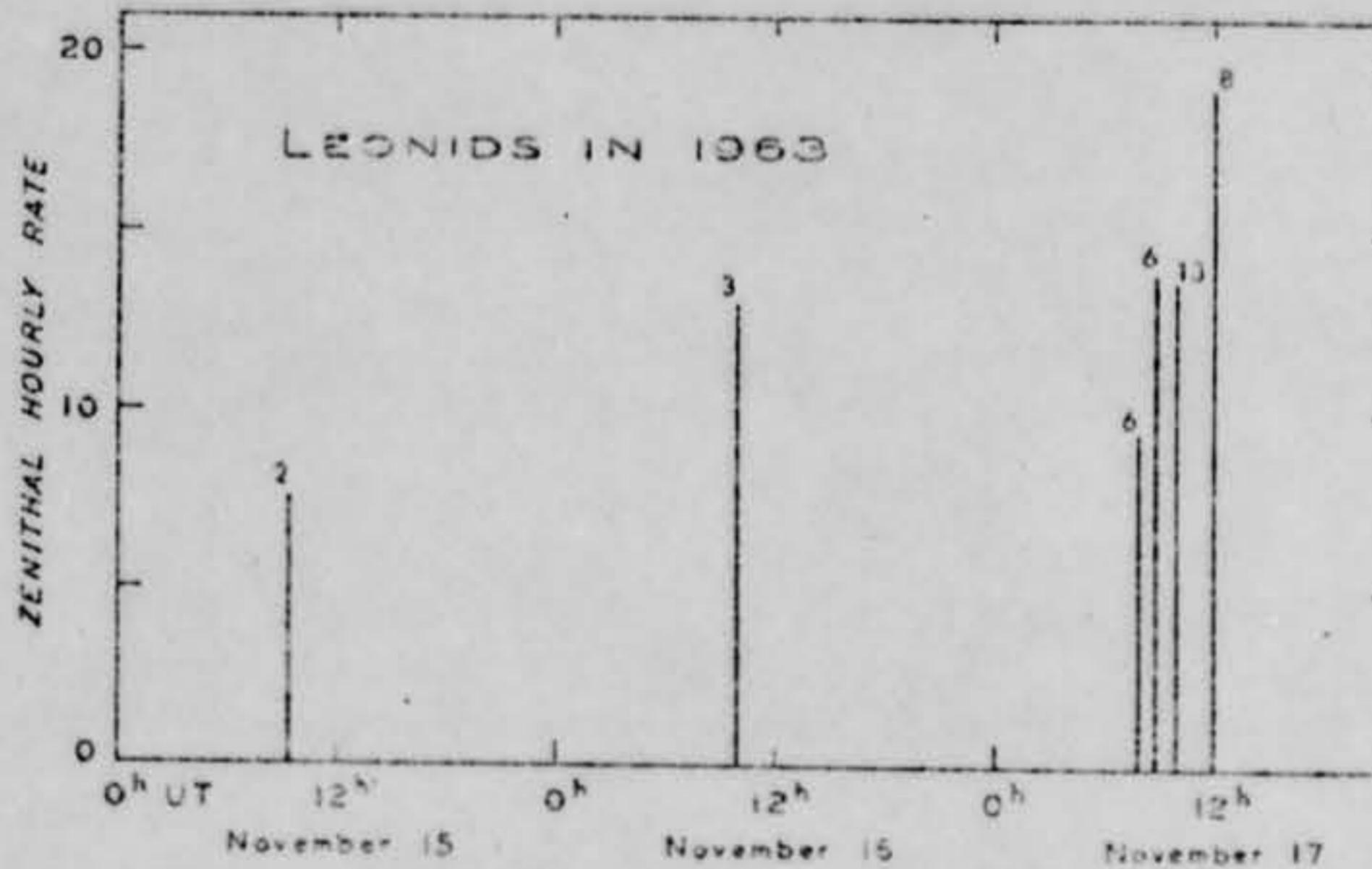
The number of Leonids an observer will count is larger the higher the radiant point is above the horizon. If the radiant were directly overhead, he could ex-

pect 10 percent more meteors than for an altitude of 60°, 30 percent more than at 45°, and 71 percent more than at 30°.

To make the tabulated counts of Leonids comparable, they must first be reduced to hourly rates, and then converted to zenithal rates. Counts made when the constellation Leo is too near the horizon cannot be safely converted.

Corrected rates, corresponding to the number of meteors that a single observer would see with the radiant in the zenith, are presented in this diagram. For simplicity, simultaneous data have been averaged. Note how the zenithal hourly rate climbed gradually to about 19 by 12<sup>h</sup> UT on November 17th. No SKY AND TELESCOPE readers reported appropriate data for the following night, so it is uncertain from this sample just when peak activity of the meteor shower actually occurred.

The increase in richness of the Leonid shower during November 15-17 is shown by these corrected counts. The length of a bar represents the number of meteors that would have been seen in one hour with the radiant exactly overhead. With each bar is the number of individual determinations that were averaged together.



#### LUNAR LIBRATION CHART

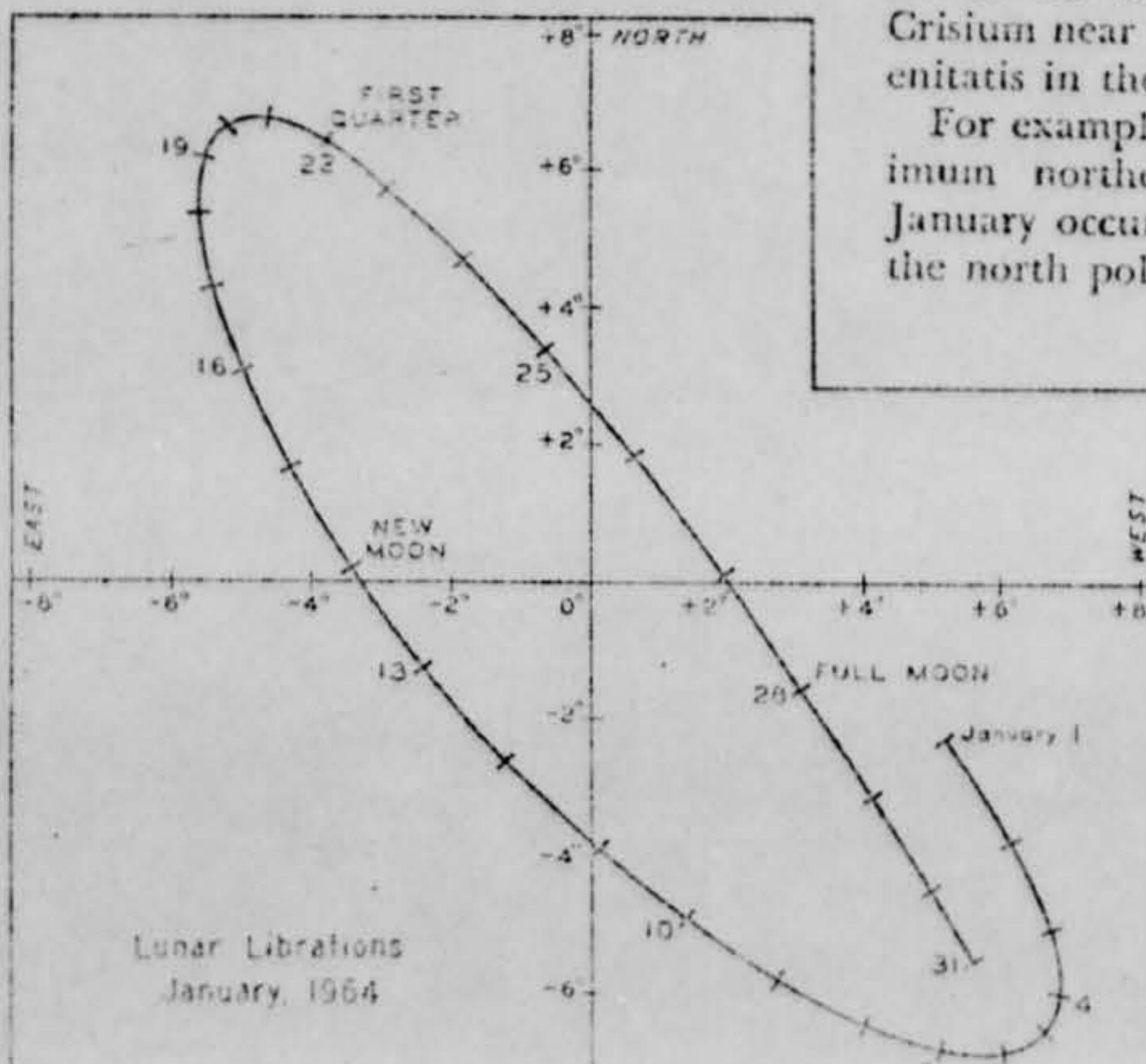
LIMB REGIONS are the least observed parts of the moon. Near the moon's edge some features are always visible, but greatly foreshortened; others are only intermittently carried into view by libration. This is the apparent monthly rocking of the moon in both north-south and east-west directions.

To predict when a particular portion

of the limb will be favorably tipped toward the earth during a month, I plot a chart like the one below. My information comes from the *American Ephemeris and Nautical Almanac*, where daily values are given for the earth's selenographic latitude and longitude (the lunar coordinates at the center of the apparent disk). Positive numbers indicate that the north or west limb is exposed. Directions are in the traditional sense, with Mare Crisium near the west-limb and Mare Serenitatis in the northern hemisphere.)

For example, my chart shows that maximum northern libration (positive) in January occurs on the 21st. At this time the north polar region may be best seen.

ALIKA K. HERRING



The curved line in this chart by Alika K. Herring shows the moon's varying librations during January. Similar charts for other months can be plotted from information given in the "American Ephemeris."

## Astronomy Films

16-mm. sound, 400-foot reels  
I THE SUN; II THE MOON;  
III SOLAR SYSTEM; IV MILKY WAY;  
V EXTERIOR GALAXIES.

### 2 x 2 SLIDES

### 35-mm. STRIPS OF SLIDES

THROUGH 200-INCH AND  
OTHER GREAT TELESCOPES

Catalogues on request.

International  
Screen Organization

1445 18th Ave. North, St. Petersburg 4, Fla.

## Precision Diagonals

You will get the best possible performance from your telescope with one of our clear FUSED QUARTZ diagonals. Accuracy guaranteed 1/20 wave.

Ellipse 1.25" x 1.77" . . \$12.00  
Ellipse 1.5" x 2.12" . . \$15.00

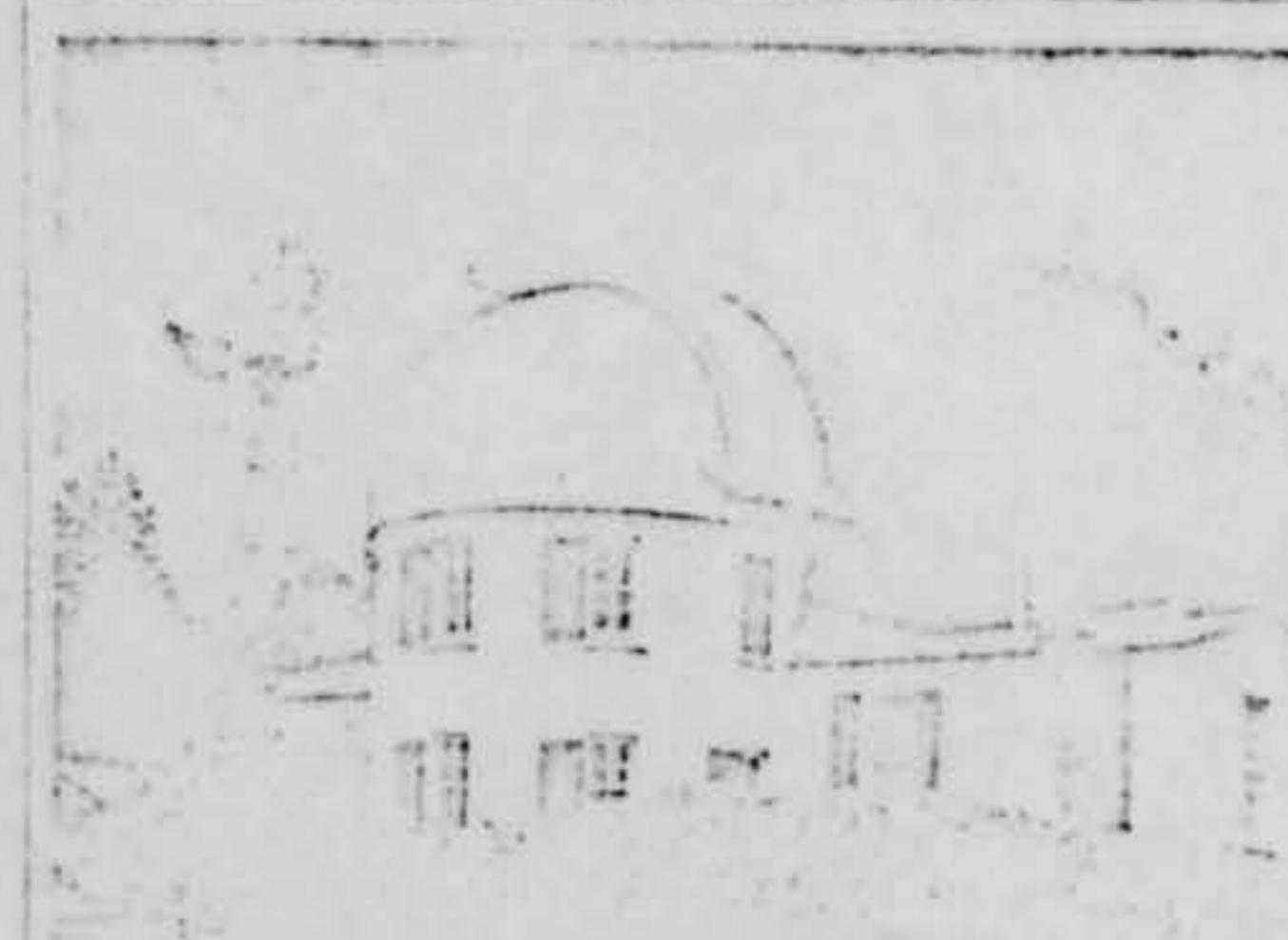
PYREX-brand glass diagonals, 1/8-wave accuracy.

Ellipse 1.25" x 1.77" . . \$6.00  
Ellipse 1.5" x 2.12" . . \$9.00

Without aluminum coating, deduct \$1.00.  
Send for our NEW list of suppliers.  
quartz mirrors, blanks, oculars,  
coatings, and accessories.

E & W OPTICAL CO.

2420 East Hennepin Ave.  
Minneapolis 13, Minnesota



Dartmouth College, Shattuck Observatory  
Hanover, New Hampshire

The original Shattuck Observatory was built in 1853-54 and was a sheet metal covered wooden dome. It was replaced by an all metal electrically operated Astro Dome with double transverse shutters. This Astro Dome houses and protects a 9.4" Alvan Clark refractor which was made in 1871 and remounted by Clark in 1910. It is utilized today in the teaching program of the observatory. The meteorological observations carried out by the Observatory constitute the largest series of climatological observations in New Hampshire, with unchanged instrumental exposure since 1855. The present director is Dr. Richard H. Goddard.

This is typical of the many Astro Dome installations being utilized by both professional and amateur astronomers throughout the world.

We would be pleased to furnish any information you might need for replacing an existing dome or a new installation.

ASTRO-DOME

PARADES ASSISTANT

23 Nov 63 01 40z

100000

22 PARADES 20 NOV 1963

2000

2 020715Z

22 PARADES 20 NOV 1963

22 PARADES

2222 100000Z NOV 1963 PARADES 20 NOV

2222 100000Z NOV 1963 PARADES

2222 100000Z NOV 1963 PARADES

INFO RELATING TO ADIV UNWOOD FLD IN

ET

UNCLA 100000Z NOV 1963

NO 2 AF AT THE ANCIL. REGAF ATTN: AFACI. SUBJECT: UFL.

THE FOLLOWING INFORMATION IS SUBMITTED IN ACCORDANCE

WITH PARAGRAPH 14, AR 213-2. A. DESCRIPTION:

(1) WHITE SMOKE - LIKE STREAM IN KY WHICH SHATTERED  
AT ET. HAD THE SAME 300-400 PAINTED RED COLORED

PARTICLES. (2) EACH OF THE 300-400 PARTICLES SIZE OF

BASEBALL AT 1000 LENGTH. (3) WHITE STREAM, NO

PARTICLE. (4) ONE STREAM, 300-400 PARTICLES

(5) PARTICLES TRAVELED THROUGH KY IN "V" FORMATION

PAGE 2 NUMBER 1. UNCLA

WHITE STREAM WHICH COULD BE THE ONE IN AT THE KY

1. PARTICLES. (2) 300-400 AT 1000 LENGTH. (3)

WHITE STREAM, (4) 300-400, (5) VEL, 1000

WHITE STREAM WHICH COULD BE THE ONE IN AT THE KY

1. PARTICLES. (2) 300-400 AT 1000 LENGTH. (3)

EXTREMITIES. (S) RESEMBLED SATELLITE OBSERVER HAD  
LIVED 10 YEARS AGO. (7) NONE. (D) DULL, FAINT SIGHT OF  
PLANE WITH OBJECT HATTERED. (O) TRIVIALE

(T) PLANE WHICH CO. DRIVER ESTIMATED TO BE TWO FEET  
HIGH AN AIRCRAFT. F. DESCRIPTION OF COURSE OF OBJECT:

(D) UPWARD BREAK IN SKY AND DULL SIGHT PLANE NOT IN.

(D) 75 DEGREES ABOVE HORIZON - SOUTH. (D) 10 DEGREES  
ABOVE HORIZON - SOUTHERN T. (4) STRAIGHT LINE, END,

INTERVIEWED RIVER AND Poughkeepsie, NY. (5) IN AP-

PROACHED OVER HORIZON. (D) 5 MINUTE. G. MANNER OF  
ELIMINATIONS: (1) GROUND - VISUAL. (2) NONE (3) MA.

H. TIME AND DATE OF SIGHTINGS: (1) 100050Z. (2) NIGHT.

I. LOCATION OF OBSERVER: 3 MILES W OF NEW PALTZ, NY.

J. IDENTIFYING INFORMATION OF OBSERVER: (1) CIVILIANS

(D) [REDACTED], AGE-35, [REDACTED]

NY; LABORER, F-S. (D) [REDACTED] AGE-33 [REDACTED]

[REDACTED] T., Poughkeepsie, NY; TRUCK DRIVER, F-S.

(C) [REDACTED] AGE-35, [REDACTED] Poughkeepsie, NY

LABORER, F-S. (D) [REDACTED] AGE-29, [REDACTED]

PAGE 3 RUEAKM 30 UNCLAS

1. (2) SET, Poughkeepsie, NY; OCCUPATION UNK F-S.

(D) [REDACTED] AGE-29, [REDACTED] Pough-

keepsie, NY; LABORER, F-S. (2) MA. G. WEATHER AND

TIME: (1) CLEAR, NO WIND. (2) SURFACE-1000 METERS AT

10000 FT. FOLLOWING WIND. ABOVE ARE 2000 FT.

10000 FT. 10000 FT. 10000 FT. 10000 FT.

10000 FT. 10000 FT. 10000 FT. 10000 FT. 10000 FT.

10000 FT. 10000 FT. 10000 FT. 10000 FT. 10000 FT.

10000 FT. 10000 FT. 10000 FT. 10000 FT. 10000 FT.

10000 FT. 10000 FT. 10000 FT. 10000 FT. 10000 FT.

10000 FT. 10000 FT. 10000 FT. 10000 FT. 10000 FT.

10000 FT. 10000 FT. 10000 FT. 10000 FT. 10000 FT.

1. LOCATED, P-5. (2) LOCATED, P-5.

2. (1) P-5, PUGHKEEPIE, NY; TRUCK DRIVING, P-5.

(2) P-5, PUGHKEEPIE, NY; TRUCK DRIVING, P-5.

3. LOCATED, P-5. (2) LOCATED, P-5.

NAME & ADDRESS OF UNCL.

WHITE, PUGHKEEPIE, NY; OCCUPATION UNCL. P-5.

(2) (1) P-5, PUGHKEEPIE, NY; LABORER, P-5. (2) UNCL. C. WEATHER AND

WIND: (1) CLEAR, NO WIND. (2) SURFACE-110 DEGREES AT

3 KNOT. FOLLOWING WIND ALLOFT ARE ESTIMATED.

ARRIVED AT BY LOCAL W.C. 6,000FT - 270 DEGREES AT

3 KNOT. 10,000FT - 260 DEGREES AT 40 KNOT.

5,000FT - 270 DEGREES AT 50 KNOT. 20,000FT - 270 DEGREES

AT 50 KNOT. 30,000FT - 270 DEGREES AT 60 KNOT.

50,000FT - 270 DEGREES AT 60 KNOT. 60,000FT - 270

DEGREES AT 60 KNOT. 80,000FT- NO ESTIMATE AVAILABLE.

(3) CEILING - NONE. (4) VISIBILITY - 7 MILES. (5) AMOUNT

OF CLOUD COVER - HIGH, THIN, SPATTERED. (6) THUNDER-

AND LIGHTNING. (7) VERTICAL TEMP. GRADIENT - UNCL.

8. OTHER AND UNCL ACTIVITY - HIGH RAINING. 9. AIR TRAFFIC P-

ASSISTANT - NONE. 10. AIR TRAFFIC - HIGH RAINING, ACCORDING

TO P-5. 11. CONTROLLING RADAR STATION - P-5.

12. OTHER ACTIVITIES - HIGH RAINING, ACCORDING

TO P-5. 13. OTHER INFORMATION - HIGH RAINING, ACCORDING

TO P-5. 14. OTHER INFORMATION - HIGH RAINING, ACCORDING

NNNN

18 Nov 16/01/63 REPORT OF THE AIR FORCE  
RUWGALE BRANCH  
MESSAGE

OI

COMING

AF IN : 35338 (22 Nov 63) C/bfb

PAGE 1 of 3

ACTION: NIN-9

INFO : XOP-1, XOPX-4, DIA-25, DIA-CIIC-2, SAF-OS-3 (45)

SMB C290

ZCHQE498ZCKNA773

RR RUEAHQ

DE RUEAKN 30 22/1706Z

ZNR

R 221705Z

FM 26AIRDIV STEWART AFB NY

TO RUWGALE/ADC

RUCDSQ/AFSC FOREIGN TECHNOLOGY DIV WPAFB OHIO

RUEAHQ/HQ USAF WASH DC

RUEAHQ/SECAF WASH DC

INFO RUEASN/26TH ADIV HANCOCK FLD NY

BT

UNCLAS 26NOIN 11-0002.,

HQ USAF ATTN: AFCIN. SECAF ATTN: SAFOI. SUBJECT: UFO.

THE FOLLOWING INFORMATION IS SUBMITTED IN ACCORDANCE

WITH PARAGRAPH 14, AFR 200-2., A. DESCRIPTION:

(1) WHITE SMOKE - LIKE STREAK IN SKY WHICH SHATTERED  
AT ITS ESE END INTO 300-400 BRIGHT RED COLORED  
PARTICLES. (2) EACH OF THE 300-400 PARTICLES SIZE OF  
BASEBALL AT ARMS LENGTH. (3) WHITE STREAK, RED  
PARTICLES. (4) ONE STREAK, 300-400 PARTICLES  
(5) PARTICLES TRAVELED THROUGH SKY IN "V" FORMATION

PILOT 4 KUBAII 30 UNCLAS

BASED UPON OBSERVER'S ESTIMATE OF ALTITUDE ("ABOUT  
50,000FT"), COLOR OF OBJECT, EXPLOSION AND RESULTANT  
SCATTERING AND SPEED. L. NONE.

DT

UNCLAS

AF IN : 35338 (22 Nov 63)  
PAGE 2 RUEAKN 30 UNCLAS

STAFF MESSAGE BRANCH  
SECURITY MESSAGE

PAGE 2 of 3

COMING

WITH ARMS OF "V" CURVED TO THE OUTSIDE AT THEIR  
EXTREMITIES. (6) RESEMBLED SATELLITE OBSERVER HAD  
SEEN TWO YEARS AGO., (7) NONE. (8) DULL, FAINT SOUND OF  
EXPLOSION WHEN OBJECT SHATTERED. (9) TRAVELED  
AT SPEED WHICH OBSERVER ESTIMATED TO BE TOO FAST

FOR AN AIRCRAFT. B. DESCRIPTION OF COURSE OF OBJECT:

(1) WHITE STREAK IN SKY AND DULL EXPLOSIVE NOISE.  
(2) 75 DEGREES ABOVE HORIZON - SOUTH. (3) 10 DEGREES  
ABOVE HORIZON - SOUTHEAST. (4) STRAIGHT LINE, ESE,  
BETWEEN HYDE PARK AND POUGHKEEPSIE, NY. (5) DISAP  
PEARED OVER HORIZON. (6) 5 MINUTES. C. MANNER OF

OBSERVATION: (1) GROUND - VISUAL. (2) NONE (3) N/A.

D. TIME AND DATE OF SIGHTING: (1) 180950Z. (2) NIGHT.

E. LOCATION OF OBSERVERS: 3 MILES W OF NEW PALTZ, NY.

F. IDENTIFYING INFORMATION OBSERVERS: (1) CIVILIANS:

(A) [REDACTED], AGE 35, [REDACTED], POUGHKEEPSIE,  
NY; LABORER, F-6. (B) [REDACTED], AGE-33 [REDACTED]

[REDACTED] ST., POUGHKEEPSIE, NY; TRUCK DRIVER, F-6.,

(C) [REDACTED] AGE-35; [REDACTED], POUGHKEEPSIE, NY;  
LABORER, F-6. (D) [REDACTED] AGE-30 [REDACTED]

to East side of ?

AF IN : 35338 (22 Nov 63)

PAGE 3 RUEAKN 30 UNCLAS

SIGHTING

STREET, POUGHKEEPLIE, NY; OCCUPATION UNK, F-6.

(E) [REDACTED] AGE-29, [REDACTED] ST. POUGH-  
KEEPSIE, NY; LABORER, F-6. (2) N/A. G. WEATHER AND  
WINDS: (1) CLEAR, NO WIND. (2) SURFACE-112 DEGREES AT  
5 KNOTS. FOLLOWING WINDS ALOFT ARE ESTIMATES

ARRIVED AT BY LOCAL WXR. 6,000FT - 270 DEGREES AT  
30 KNOTS. 10,000FT - 260 DEGREES AT 40 KNOTS.

16,000FT - 270 DEGREES AT 50 KNOTS. 20,000FT - 270 DEGREES  
AT 50 KNOTS. 30,000FT - 270 DEGREES AT 60 KNOTS.

50,000FT - 270 DEGREES AT 65 KNOTS. 60,000FT - 270  
DEGREES AT 35 KNOTS. 80,000FT - NO ESTIMATE AVAILABLE.

(3) CEILING - NONE. (4) VISIBILITY - 7 MILES. (5) AMOUNT  
OF CLOUD COVER - HIGH, THIN, SCATTERED. (6) THUNDER-  
STORMS-NONE. (7) VERTICAL TEMP. GRADEINT - UNK.

H. OTHER UNUSUAL ACTIVITY - NONE KNOWN. I. INTERCEP-  
TION - NONE. J. AIR TRAFFIC - NONE KNOWN, ACCORDING  
TO CHIEF CONTROLLER, HANCOCK FLD, NY. BALLONS -  
NONE. K. STAFF INTELLIGENCE OFFICER, DIRECTORATE  
OF INTELLIGENCE, HEADQUARTERS 26TH NORAD/CONAD  
REGION. OPINION FORMED IS THAT SIGHTING WAS A METEOR,  
BASED UPON OBSERVER'S ESTIMATE OF ALTITUDE ("ABOVE  
50,000FT"), COLOR OF OBJECT, EXPLOSION AND RESULTANT  
SHATTERING AND SPEED. L. NONE.

BT NOTE: ADVANCE COPY DELIVERED TO DIA & NIN

TELESCOPES • BINOCULARS • MICROSCOPES

OPTICA

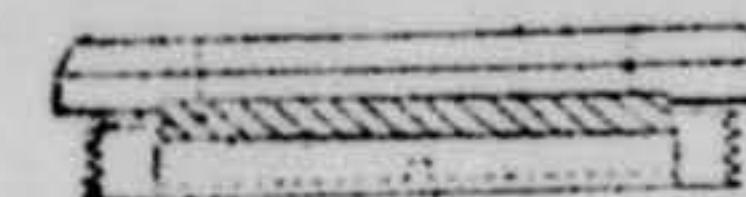
EQUIPMENT  
and SUPPLIES

## NEW ASTRO-CAMERA

(Shown with back removed and focusing screen on image magnifier in place.)

COMPARE: A. Uses standard 127 black-and-white or color film. B. Locking cable release for time exposures. C. Threaded tube accepts filters. D. Flexible focusing screen. E. Six-bladed shutter. F. Feather-light — no drag on gears or drive. G. Complete instructions. H. Guaranteed. I. Available for 1 1/4" or 24.5-mm. eyepiece holders. It's easy to produce exciting astrophotos with the AC-1, designed expressly for the amateur. Image magnifier \$2.00 extra.

ASTRO-CAMERA MODEL AC-1 ..... \$39.95



## FILTERS

For Observation and Astrophotography  
Professionals Use and Recommend ThemBLUE — GREEN — YELLOW — ORANGE — RED — DARK RED  
\$3.50 each — Complete set of 6, \$16.00SUN OR MOON | POLAROID  
\$3.50 each — Both, \$5.00

INFRARED OR ULTRAVIOLET — \$10.00 each; Both, \$16.00

Supplied in machined metal holders.

NEW PUBLICATION: FILTERS FOR OBSERVATION AND ASTROPHOTOGRAPHY. Most complete; lists of objects and recommended filters; profusely illustrated; 3rd edition, \$1.95. Delivery in June. Orders placed now, special price of \$1.50.

PUBLICATION CATALOGUE #24 — Over 300 selected astronomical and optical books, maps, etc. ... send 25c

ASTRONOMICAL SPECTROSCOPE #SPEC-11 .... \$49.95  
ASTRONOMICAL SPECTROSCOPY: 256 pages .... \$3.95  
SUN DIAGONAL — Eliminate 95% heat and light \$16.95  
CLEANING KIT #1 — Brush, liquid, and tissue ... \$2.00  
CONVERTER MODEL #C12A delivers constant household current from standard 12-volt auto battery ... \$19.95  
BARLOW — 2x, achromatic, best quality .... \$13.95  
ZOOM EYEPIECE — 21 to 8.4 mm., \$27.95; with Barlow ..... \$37.52  
ZOOM EYEPIECE — 25 to 12.5 mm., \$29.95; with Barlow ..... \$39.12

\* In ordering, specify for 24.5-mm. or 1 1/4" eyepiece holders. SPECIAL PRICES EXPIRE 60 DAYS FROM THIS ISSUE.

write for FREE catalog

OPTICA b/c  
3823 MacArthur Boulevard  
Oakland 19, California, U.S.A.

## OBSERVER'S PAGE

Universal time (UT) is used unless otherwise noted.

## MANY OBSERVERS COUNT LEONIDS

THIS YEAR'S Leonid meteor shower was about as active as the display in 1962 (described in this department last January). Apparently, the maximum occurred on the night of November 16-17, but hourly rates remained below those of 1961 (SKY AND TELESCOPE, February, 1962, page 64).

Most observers agreed that the shower members were strikingly bright, left short trains, and were predominantly white. Ralph Boineau of Columbia, South Carolina, comments, "Almost all the Leonids brighter than 1st magnitude left trains that endured from two to five seconds. The trains from these swift meteors were short, none longer than 20 degrees. All the Leonids I saw were white with just a touch of orange in about half the cases."

As in past years, fireballs were sighted along with other shower members. John Smatko, Yonkers, New York, saw a Leonid fireball "as bright as the quarter moon" through a hole in the clouds 10 degrees west of the radiant. This was at 4:37 a.m. Eastern standard time on November 18th. The meteor left a train that was quickly distorted.

The table lists meteor rates by 17 amateurs who recorded individual counts over specific intervals. Beside each name the observing period is stated in Universal time. *L* is the number of Leonids counted during that interval, *S* the number of sporadic (non-Leonid) meteors. The last column indicates the direction *D* that the observer was facing. All observations were made under reportedly clear skies.

One observer worked on three nights —

| Observer    | Time (UT)   | L  | S  | D  |
|-------------|-------------|----|----|----|
| NOVEMBER 15 |             |    |    |    |
| Millard     | 9:00-10:00  | 6  | 5  |    |
|             | 10:00-11:00 | 3  | 5  |    |
|             | 11:00-11:15 | 2  | 3  |    |
| NOVEMBER 16 |             |    |    |    |
| Millard     | 9:00-10:00  | 12 | 6  |    |
|             | 10:00-11:00 | 20 | 9  |    |
|             | 11:00-11:15 | 5  | 2  |    |
| Morrison    | 10:45-12:15 | 7  | 5  |    |
| NOVEMBER 17 |             |    |    |    |
| Chapman     | 9:20-10:20  | 16 | 28 | NE |
|             | 11:30-12:30 | 23 | 14 | NE |
| Davis       | 9:20-10:20  | 6  | 7  | SE |
|             | 11:30-12:30 | 20 | 8  | SE |
| Karger      | 6:20- 7:20  | 6  | 3  | W  |
|             | 7:20- 8:20  | 6  | 11 | W  |
|             | 8:20- 9:20  | 7  | 8  | W  |
|             | 9:20-10:20  | 14 | 9  | W  |
| Key         | 7:00- 8:30  | 13 | 7  |    |
| Larson      | 9:20-10:20  | 10 | 15 | N  |
|             | 11:30-12:30 | 19 | 13 | S  |
| McCants     | 7:20- 8:20  | 7  | 8  | W  |
|             | 8:20- 9:20  | 11 | 7  | W  |
|             | 9:20-10:20  | 14 | 5  | W  |
| McDonald    | 9:20-10:20  | 14 | 13 | NW |
|             | 11:30-12:30 | 16 | 14 | NW |
| McLean      | 9:20-10:20  | 11 | 10 | S  |
|             | 11:30-12:30 | 29 | 11 | N  |
| Meeus       | 0:18- 1:03  | 0  | 2  | E  |
| Millard     | 9:00-10:00  | 5  | 4  |    |
|             | 10:00-11:00 | 15 | 4  |    |
|             | 11:00-11:15 | 6  | 1  |    |
| Milon       | 9:20-10:20  | 7  | 12 | E  |
|             | 11:30-12:30 | 30 | 11 | E  |
| Molinaire   | 6:20- 7:20  | 2  | 4  | E  |
|             | 7:20- 8:20  | 3  | 13 | E  |
|             | 8:20- 9:20  | 10 | 3  | E  |
|             | 9:20-10:20  | 7  | 4  | E  |
| Morrison    | 11:00-13:30 | 14 | 9  |    |
| Russell     | 6:20- 7:20  | 7  | 23 | E  |
|             | 7:20- 8:20  | 5  | 14 | E  |
|             | 8:20- 9:20  | 19 | 4  | E  |
|             | 9:20-10:20  | 18 | 9  | E  |
| Sears       | 9:20-10:20  | 9  | 10 | SW |
|             | 11:30-12:30 | 20 | 14 | SW |
| Souther     | 6:20- 7:20  | 2  | 7  | W  |
| Thomson     | 6:20- 7:20  | 3  | 9  | S  |
|             | 7:20- 8:20  | 1  | 10 | S  |
|             | 8:20- 9:20  | 7  | 4  | S  |
|             | 9:20-10:20  | 4  | 5  | S  |

J. Millard at Atlanta, Georgia. J. Meeus is in Kessel-Lo, Belgium. L. Key at Fernandina Beach, Florida, and R. Morrison in Los Angeles, California.

Two teams of observers supplied the bulk of the meteor counts. C. Chapman, D. Davis, J. Fountain (timekeeper), S. Larson, L. McDonald, D. McLean, D. Milon, and W. Sears watched from Kitt Peak, Arizona. At Montgomery, Texas, another group consisted of Karger, M. McCants, B. Molinaire, Russell, and K. Thomson; Souther kept time during most of the observing session.

On the morning of November 16th, between 2:30 and 4:00 a.m., Central standard time, Randy Baldwin, Wayne

On November 17th at 2:24 a.m. Pacific standard time, Robert La Pierre of Whittier, California, photographed this Leonid of magnitude -2. He used a 35-mm. Argus camera set at f/3.5 and Plus-X film. He also recorded the Perseid meteor shown on page 299 in the November issue. That picture was incorrectly credited to William OKer, an observing companion.